Ecological Restoration Institute

Fact Sheet: Post-Wildfire Fuels and Regeneration Dynamics March 2011

What to expect following severe wildfires in ponderosa pine forests

Western forests are increasingly subject to large, severe wildfires that leave behind large quantities of standing and fallen woody debris. In areas that experience total overstory tree mortality, a lack of seed sources may affect future ecosystem trajectories. ERI researchers studied 14 ponderosa pine-dominated wildfire sites of different ages throughout Arizona to better understand snag and woody debris dynamics, and to assess post-fire regeneration in terms of probable future successional trajectories.

Research Findings

- Wildfire-damaged snags decayed over time, lost their bark and, eventually, broke apart.
- The majority of standing snags fell over about ten years after wildfire (Figure 1), which closely paralleles the results of a similar study of Flagstaff area wildfires by Passovoy and Fulé (2006).
- Coarse woody debris (CWD) was much higher at older sites than more recently burned sites. While CWD exceeded the "optimal" range for dry conifer forests suggested by Brown et al. (2003) in the time period 6-12 years after fire, the peak period was brief and CWD rapidly dropped into the range of recommended values (Figure 2).
- Coarse woody debris was predominantly sound for several years after the wildfire but became predominantly rotten about 16 years after the fire event (Figure 2).
- Regeneration was variable across sites, but was often dominated by sprouting deciduous species, such as oak and aspen (Figure 3).
- Ponderosa pine regeneration was completely lacking at 57 percent of the sites; only one site had exceptional ponderosa pine regeneration.

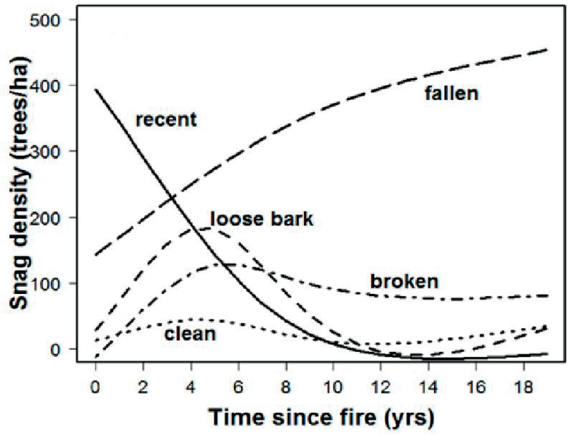

Figure 1. A model of snag dynamics based on data from 14 Arizona wildfire sites indicates that the majority of snags either broke or had fallen over by about ten years after the wildfire.

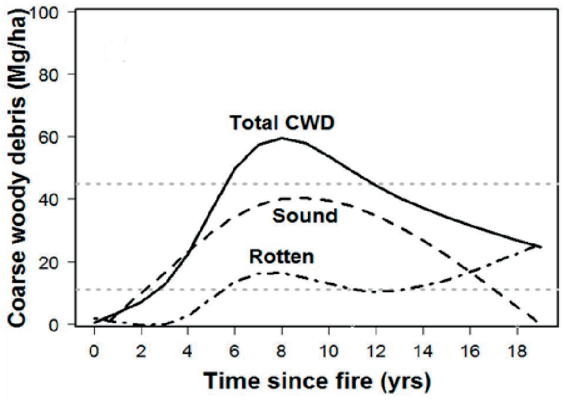

Figure 2. Coarse woody debris (CWD) loadings exceeded the "optimal" range (dotted horizontal lines) for dry conifer forests suggested by Brown et al. (2003) in the time period 6-12 years after fire. However, the peak period was brief and CWD rapidly dropped into the range of recommended values.

(over)

The Ecological Restoration Institute is dedicated to reversing declines in the condition of forested communities throughout the Intermountain West, particularly those affected by severe wildfires and insect outbreaks. Our efforts focus on science-based research of ecological and socio-economic matters related to restoration as well as support for on-the-ground treatments, outreach, and education.
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Management Implications

- The widely used snag transition model developed by Thomas et al. (1979) is an appropriate management tool to assess snag dynamics in post-wildfire environments, although the "clean" snag category, which is relatively low in abundance, is not strongly correlated with time since fire.
- Managers can expect that most snags will fall about a decade after a wildfire. Given this short timeframe and the habitat that snags provide for wildlife, there is little reason to consider removing standing snags.
- Managers can expect that sound CWD will transition to rotten by about 16 years after a wildfire.
- The highest fire hazard at post-wildfire sites may occur 6-12 years after fire when CWD may exceed the fuel loading range recommended by Brown et al. (2003).
- Due to the potential for sprouting by deciduous species and low conifer regeneration, some post-fire sites may shift from a previously ponderosa pine-dominated forest to an alternate stable state, such as a shrubfield or grassland.

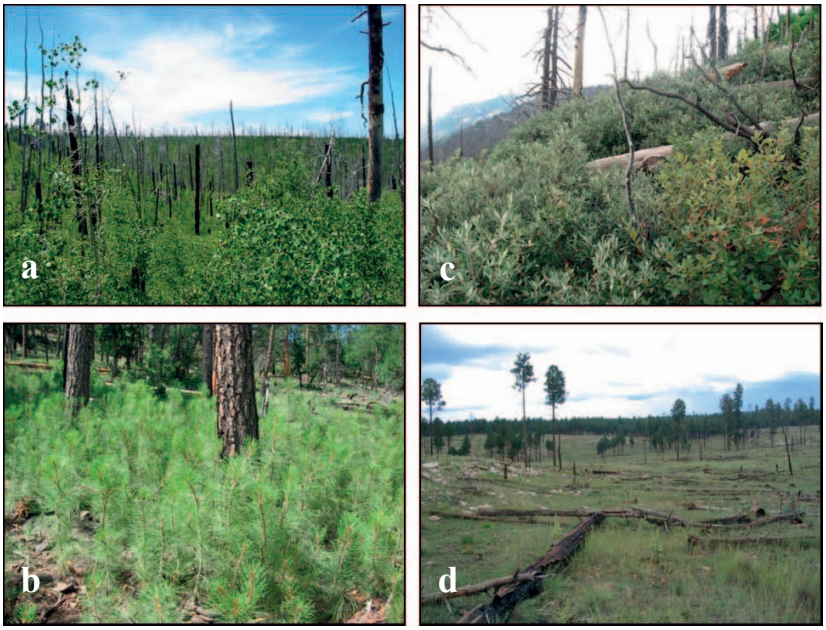

Figure 3. Regeneration was variable and included sites with a) prolific aspen regeneration (Outlet Fire); b) prolific pine regeneration (Pine Mountain Fire); c) abundant oak regeneration (Aspen Fire); and, d) no re-generation (Pot Fire).

References

Brown, J.K., E.D. Reinhardt, and K.A. Kramer. 2003. Coarse woody debris: Managing benefits and fire hazard in the recovering forest. USDA Forest Service General Technical Report. RMRS-GTR-105.

Thomas, J.W., R.G. Anderson, C. Maser, and E.L. Bull. 1979. Snags. Pages 60-77 in J.W. Thomas, ed., Wildlife habitats in managed forests: The Blue Mountains of Oregon and Washington. USDA Agricultural Handbook 553.

Passovoy, M.D. and P.Z. Fulé. 2006. Snag and woody debris dynamics following severe wildfires in northern Arizona ponderosa pine forests. *Forest Ecology and Management* 223:237-246.

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